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RADC-TR-66-307
Final Report



RECONNAISSANCE EXPLOITATION TEST SHELTER

Capt. Warren M. Emlen, USAF

TECHNICAL REPORT NO. RADC-TR-66-307
August 1966

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Rome Air Development Center
Research and Technology Division
Air Force Systems Command
Griffiss Air Force Base, New York

RECONNAISSANCE EXPLOITATION TEST SHELTER

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FOREWORD

This final technical report describes the Reconnaissance Exploitation Test Shelter (RETS) which was designed as a very flexible work facility for photo interpretation. The primary factors influencing this design were:

- (1) Transportability but not mobility was desired,
- (2) No photo interpretation equipment should be permanently mounted during operation,
- (3) Militarization was not a requirement, and
- (4) The cost should be kept as low as possible without sacrificing suitability for the job to be accomplished.

The RETS is in use as a test shelter, both to test the concept of flexibility in arrangement of the work area, and to test the usability of the data produced by modern sensors.

The information given in this report has been compiled from the instruction and maintenance manuals furnished with the equipment, and from personal observations by the author.

This report does not contain all the detailed information necessary for operation of the Reconnaissance Exploitation Test Shelter. Rather, it is intended only as an introduction to the equipment to be used by those organizations which have a need for a transportable photo interpretation facility.

The RETS was delivered to Rome Air Development Center by the Space and Defense Systems Division of the Fairchild Camera and Instrument Corporation, 300 Robbins Lane, Syosset, New York, under Contract AF30(602)-3970, Project 6506. Delivery on an accelerated schedule was obtained ten weeks from the date of contract.

Comments on this report, and on image interpretation facilities and equipment in general, are solicited and should be forwarded to: RADC (EMIRA), Griffiss AFB, New York 13440.

This report has been reviewed and is approved.

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ABSTRACT

The Reconnaissance Exploitation Test Shelter (RETS) was designed as a very flexible work facility for photo interpretation. Work stations may be positioned in any arrangement desired, within the constraints of the 8' x 8' x 23' long shelter. Three-phase, 60 cycle, 110/220 volts power is supplied by two 12KW diesel generators; and air conditioning is provided by two 40,000 Btu units connected to the shelter by flexible ducts. The internal equipment complement consists of photo interpretation light tables, stereoscopes, and other photo interpretation tools, cabinets, and aluminum pegboard on both side walls for shelving, hooks, etc. Spare parts for one year's operation are included for the critical equipment.

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SECTION I

INTRODUCTION

One of the major aspects of any deployment situation is the provision of adequate working facilities for the operational personnel. The Reconnaissance Exploitation Test Shelter (RETS) is aimed at providing these facilities for the image interpreter. Such a facility may be designed in many ways; however, the primary factors affecting its design are the amount of mobility desired and the job which it is intended to accomplish. In this particular case, a great amount of mobility was not desired, but a large amount of flexibility in the use of the shelter interior space was a requirement.

The RETS consists of a 23-foot shelter, 2 diesel generators, 2 3-ton air-conditioners, and image interpretation equipment. The equipment used inside the shelter is bolted or tied down for transport only, and no equipment is secured during normal operations. This is a complete reversal from the design of the Image Interpretation Central, AN/MSQ-58; and it could be accomplished because of the different type equipment in the RETS as compared to the AN/MSQ-58. In general, the image interpretation equipment in the RETS consists of manually-operated light tables, whereas the AN/MSQ-58 is more sophisticated with a multisensor viewer, computer, and plotter.

SECTION II

THE SHELTER GROUP

I. SHELTER

The shelter is a Craig Systems Corporation Model No. H-433M (Figure 1). It is approximately 23 feet long, 8 feet wide, and 8 feet high. It has the same type of construction as the standard S-141 Shelter, Electrical Equipment and the S-315 shelter for the AN/MSQ-58: polyurethane foam inside an aluminum sandwich, plus aluminum I-beams for structural rigidity. The empty shelter weighs approximately 9,000 pounds (including the wheels). It was not constructed to meet all the requirements of MIL-E-4970 or MIL-T-4807; however, it has sufficient structural rigidity to withstand transport by truck, aircraft, and towing (either skidding for a short distance or on the wheels).



Figure 1. Shelter, Air-Conditioners, Generators, and Auxiliary Fuel Tank

In particular, the shelter will endure the following environmental conditions:

- a. high temperature: +72° C. for storage and +52° C. for operation,
- b. low temperature: -62° C. for storage and -40° C. for operation,
- c. altitude: 5.54 in. Hg for airborne transportation, and 20.58 in.Hg for operation,
- d. salt spray,
- e. fungus,
- f. rain,
- g. sand and dust,
- h. vibration: typical of aircraft and truck transport, and
- i. shock: 6-inch drop.

The shelter is painted glossy white (Color No. 17886, FED-STD-595) on the outside. The interior of the shelter has a flat white (No. 37875) ceiling and flat light green (No. 34672) walls. The basic shell of the shelter has been modified to provide the following items:

a. Dutch door.

The shelter door is approximately 30 inches wide and 65 inches high. It is divided at about half the height so that the top half may be opened to admit film, documents, etc., without admitting personnel. The top half of the door has a latch to hold it (and the bottom half when it is connected) fully open. The door also has a pressure relief and fresh air vent which must be opened during air transport.

b. Power entry panel.

This panel is located just around the corner from the door. It contains 2 receptacles for input power from the generators, 2 power output receptacles for the air-conditioners, 2 signal receptacles for the air-conditioner thermostats, a grounding lug, and a standard duplex outlet for convenience.

c. Air-conditioner ports.

On the same side of the shelter as the power entry panel, are located four ports for the air-conditioner ducts — 2 for conditioned air input near the top center of the shelter, and 2 for exhaust air near the lower ends of the shelter. The air-conditioner ducts must be attached by slipping them over the flanged port and then holding them there by tightening a metal ring. The ports are covered by a hinged door when they are not being used. If one air-conditioner is connected to the shelter, the second set of ports remain closed so that cooling air is not lost.

d. Floodlight.

Mounted near the top in the center of the shelter is a floodlight for nighttime illumination of the generators and air-conditioners. This light is mainly used to prevent anyone from tampering with the equipment, but it would not suffice for night maintenance. For maintenance, the convenience outlet on the power entry panel may be used to plug in a droplight.

e. Signal entry panel.

This panel is located on the same side of the shelter as the power panel, at the opposite end of the shelter. This panel contains two lugs for connection of a field telephone line, and a cannon-type connector for a 6-station all-master intercom cable.

f. Shelter end wall.

The entire end wall (opposite the door end) is removable. When it is removed, a 3-inch lip remains all around the shelter sides. A ramp is used over this lip for moving heavy equipment into, and out of, the shelter. The end wall contains a fresh air exhaust outlet (a 400 c.f.m. fan is mounted directly over the opening on the inside of the wall), and an escape hatch which is approximately 18 inches square.

2. TRANSPORTER

In order to transport the shelter, it is equipped with four caster-jack-dollies (Craig Systems Corp. Model G-353). These units are about six inches taller than the shelter. They are mounted on each corner of the shelter, and they each have two pneumatic rubber tires approximately 24 inches in diameter (Figure 2). These units are used to raise the shelter to a height of about 50 inches, as well as for leveling it and moving it.

The transporters may be raised (i.e., the shelter lowered) to allow the shelter skid base to rest completely on the ground; or, they can be used to level the shelter on uneven ground at any height up to the maximum of 48 inches. The raising and lowering of the shelter is accomplished by a hand-operated jack located at the top of the transporter. Approximately 15 full turns of the crank are required to raise the shelter one inch, so that, if the shelter is to be raised and lowered very often, it would be wise to purchase electric motors for the cranks at an additional cost of about \$1,000. Since the shelter should not be twisted during raising and lowering, at least the two end jacks must be operated at the same time and at the same rate. Normally, one man operates each of the four jacks.

Speeds up to 5 miles per hour over improved surfaces may be realized with these particular transporters, if the shelter is not raised more than 14 inches (between the bottom of the skids and the ground). Since each wheel assembly is independent of the rest, they may be castered so as to tow the shelter forward, backward, or sideways. A detachable towbar is used for towing (the towing eyes at the base of the shelter are used for skidding) either forwards or backwards. The towbar ends in a lunette eye for attachment to any military vehicle with a standard hitch.

The transporters are capable of supporting about 7,000 pounds each, and they will withstand a sideload of 3,000 pounds when the shelter is raised 14 inches. They will also withstand the sideoads encountered while loading it into a C-130 aircraft at its

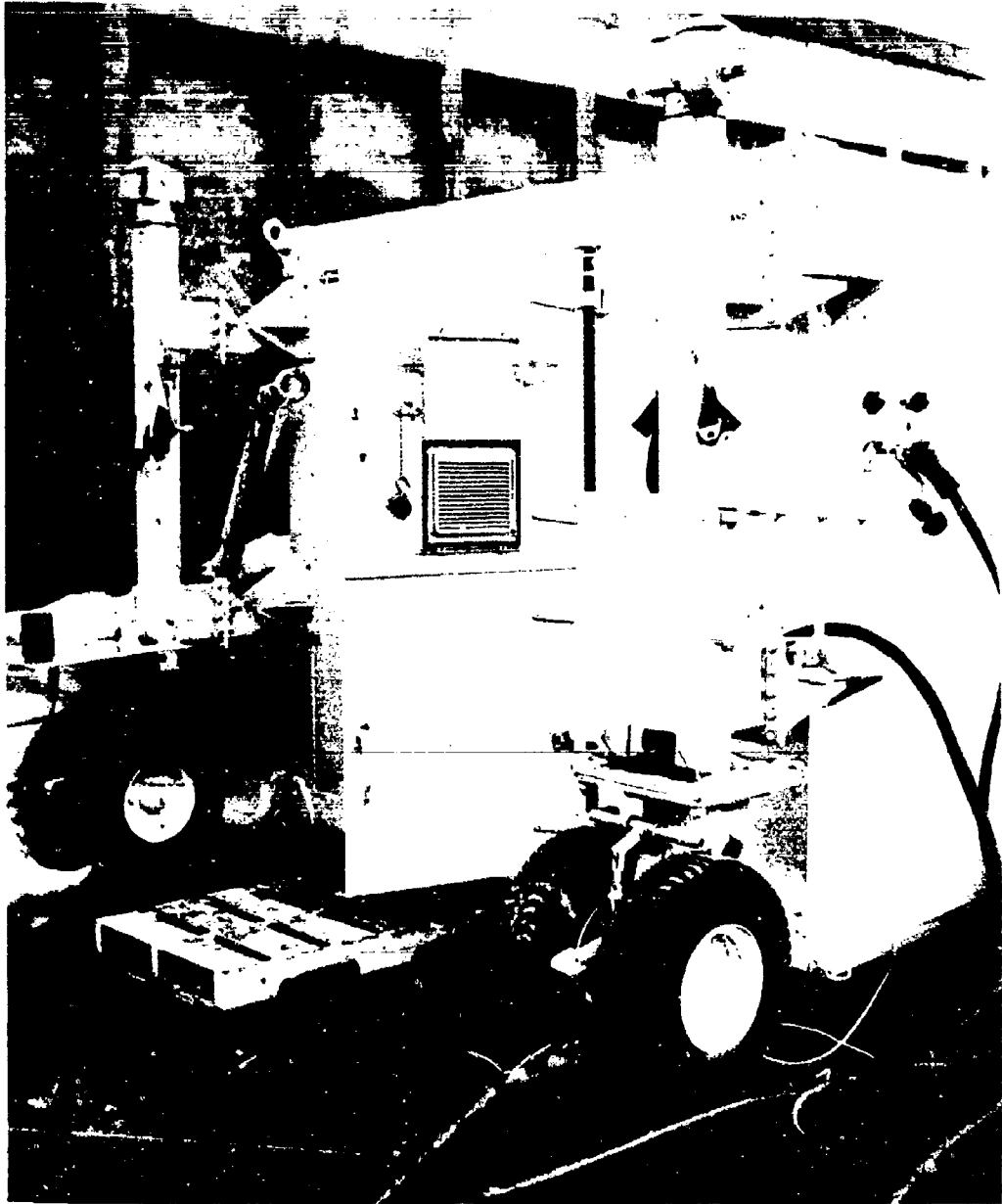


Figure 2. Front End of the Shelter, Showing Transporter, Dutch Door, Power Input Panel, and Tow Bar

full loading height of 43 inches. Each set of wheels has a manually actuated parking brake which is part of the wheel caster assembly. The transporters may be removed from, and reassembled to, the shelter without special tools. For loading onto a flat-bed semitrailer truck, the transporters are moved to their outboard position, the shelter is raised to its fullest height, and the trailer is positioned under the shelter. The shelter is then lowered onto the trailer, the wheels raised, and the transporters swung into the inboard position. This shelter (with transporters attached), loaded on a semitrailer, is an oversize load for most of the highways in the United States.

3. ELECTRICAL POWER

The electrical power for the shelter is supplied by two Onan Model 15RDJC-4R diesel generators. This generator (Figure 1) is 40-1/8 inches high, 27 inches wide, and 73-13/16 inches long, and it weighs 1,220 pounds. A four-cylinder diesel engine drives the 12 kilowatt (continuous service), three-phase, 120/240 volt, 0.8 power factor, 60-cycle generator. The generator will provide 15 kilowatts of power on an intermittent service basis. Voltage regulation is ± 3 percent, and frequency regulation is ± 5 percent.

The generator set has the following features for easy and efficient operation:

- a. An ammeter for each phase
- b. A voltmeter with a phase-selector switch
- c. An hour meter to denote total running time
- d. A battery charge rate ammeter
- e. An oil pressure gauge
- f. A water temperature gauge
- g. A preheat switch for the manifold and glow plugs
- h. Panel lights
- i. Circuit breakers (one 55-amp breaker for each phase)
- j. Stop-start switch
- k. Emergency provisions, including:
 - (1) High water temperature cutout
 - (2) Cranking limiter
 - (3) Low oil pressure cutoff
 - (4) Emergency latch relay with reset and indicator light
- l. An automatic fuel transfer system and a 15-gallon internal fuel tank.

The fuel supply is stored in a 500-gallon collapsible tank made of Buna-N synthetic rubber by B. F. Goodrich Aerospace and Defense Products. When empty, the tank and its associated fittings weigh about 100 pounds, and it can be stored in the shelter when it is not in use. It folds to a compact 6 inches by 24 inches by 36 inches. A fuel transfer pump and an on-off switch on the generator allow fuel to be transferred from the auxiliary tank to the generator tanks. This transfer process operates automatically, turning on when the internal tank is nearly empty, and turning off when the internal tank is full. The auxiliary tank is fitted with a pressure-feed filling spout and a fuel-transfer outlet. The fittings and hoses have special valves so that when the hoses are disconnected, fuel is not lost. Since the auxiliary tank does not contain any air, transfer of its fuel content merely causes the tank to collapse. This tank must be cleaned out prior to reshipment.

There are actually two diesel generators associated with the RETS. This was done for two reasons: reliability (through redundancy) and sufficient power. The entire shelter may be operated from one generator; however, this causes it to produce 12 kilowatts continuously. If additional electrical equipment operation is desired, the second generator may be started and half the equipment operated from the power of each generator. Since most of the equipment in the shelter (including two air-conditioners) can be operated from one generator, the second generator will mainly be used for standby operation.

4. AIR-CONDITIONING

Conditioned air is supplied by an Airtemp Model 1104-01 air-conditioner (Figure 1). This unit provides about 40,000 B.t.u.'s of cooling, uses refrigerant R-22, operates from 208/220 volts, three phase-power, and weighs about 460 pounds. When the outside temperature is 100° F., for instance, and the relative humidity is 60 percent to 70 percent, the temperature drop between the air intake and conditioned air outlet would be about 14° F.; as the humidity increases, the temperature drop lessens. Therefore, since it was desired that the shelter be operational when it is used under warm, humid conditions, provision was made to operate two of these air-conditioners at the same time. The thermostat for one air-conditioner is set at the desired temperature level, while the thermostat for the second unit is set about 5° above the desired temperature. This method makes one air-conditioner operate full time, and the second unit only cycles on when the temperature gets too high and the first unit needs assistance. This is done for two reasons: (a) the second unit does not work as hard and, therefore, should have a longer operational time before failure; and (b) the two units will probably not kick on at the same time, causing a large power drain on the generator. A third complete air-conditioner was supplied with the RETS in order to provide a backup unit in case of a failure during hot weather.

The air-conditioners are connected to the shelter by two 20-foot flexible ducts. These ducts are approximately 12 inches inside diameter. They are attached to both the air-conditioners and the shelter by sliding the end of the duct over a flange. A metal ring is then tightened to hold the duct onto the flange. This arrangement is not as easy to work with as the flange and locking pin arrangement on the AN/MSQ-58 air-conditioner ducts; however, this shelter does not have the setup and takedown time requirements of the AN/MSQ-58. It is anticipated that the ducts will be connected and disconnected no more than once in a six-months' period. If only one of the air-conditioners

is used, then only one set of ducts is connected to the shelter, and the doors covering the ports on the shelter for the second set remain closed. For transport, the ducts are compressed to about 5 feet long, and a securing rod is inserted into the duct to hold it in the compressed attitude. The ducts are then tied down to the top of the air-conditioners, and the units rolled on their dollies up to the ramp through the back end of the shelter and secured to the shelter floor.

The air-conditioners only cool the air — they do not heat it. Therefore, for heating, standard electrical forced air heaters are used by plugging them into the wall outlets. These heaters each provide about 5,000 B.t.u.'s of warm air, and it has been found through experience that six of these units will adequately warm the shelter at 20° F. A shelter constructed to operate under cold conditions would utilize an air-conditioner with a built-in heater so that floor units would not take up room in the shelter.

SECTION III

THE SHELTER INTERIOR

The interior of the shelter has provisions for operation of the external equipment plus the standard items found in almost any workroom. The interior has been made so that it can be utilized for almost any task, provided that the equipment used does not require elaborate installation modifications and hardware.

1. POWER CONTROL PANEL

The controls for the shelter power are located just to the right of the door as you enter the shelter (Figure 3). The panel is about two feet square and contains the following items:

a. Single/Dual Generator Switch.

This switch divides the power for the electrical equipment between the two generators. When one generator is used, its power is fed to all the interior electrical equipment and both air-conditioners. When two generators are in use, the power is divided so that half of the electrical outlets and one air-conditioner are connected to each generator. This switch was installed so that more than 50 percent load would be on a generator at all times. The minimum load requirement is imposed because the diesel engines, when run under light load conditions, tend to incompletely burn the fuel and the cylinders become glazed. This condition results in the requirement for early overhaul of the engine.

b. Air-Conditioner Circuit Breakers.

These circuit breakers are used to protect the air-conditioner circuits. The thermostats for the air-conditioners are located on the wall of the shelter and they are connected to the air-conditioners via wiring through the power control panel.

c. Lights Circuit Breaker.

One circuit breaker is used to protect the light circuit. Each light has an individual on/off switch; however, the circuit breaker would normally be used to turn all the lights on and off at the same time.

d. Outlet Circuit Breakers.

One circuit breaker is provided for each duplex electric outlet.

2. WALLS

The two side walls have aluminum pegboards (Figure 4) installed from about 36 inches off the floor to the ceiling. The end walls are clean except for a few miscellaneous items which will be mentioned below. The pegboard was installed on both 22-foot walls so that shelving, hooks, and other standard pegboard hardware may be utilized at any point in the shelter. If it is desired to utilize maps, reports, previous target coverage, etc., then this graphic and textual material may be displayed on the pegboard by attaching it with tape. If a cabinet or piece of equipment is to be used in front of the pegboard, then the pegboard itself is not used at that point. Just underneath

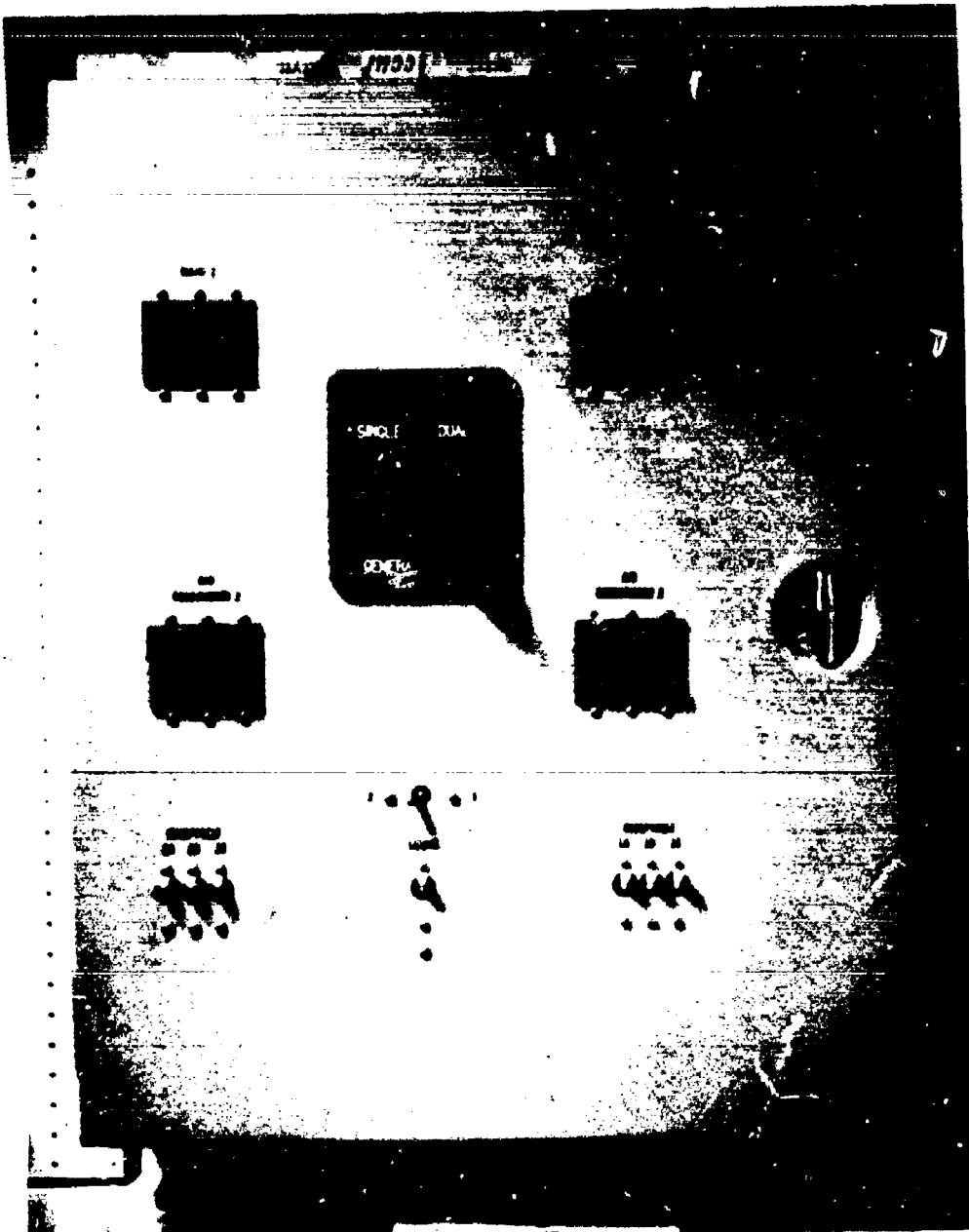


Figure 3. Power Control Panel

the pegboard is an electrical raceway to provide 60-cycle, single-phase, 120 volt power. Duplex receptacles are spaced every four feet on the side walls.

The rear end wall is removable, and it does not contain anything except the 400 c.f.m. fan perviously mentioned. The wall at the door end of the shelter is entirely blank. A wiring diagram is attached to the top half of the Dutch door.

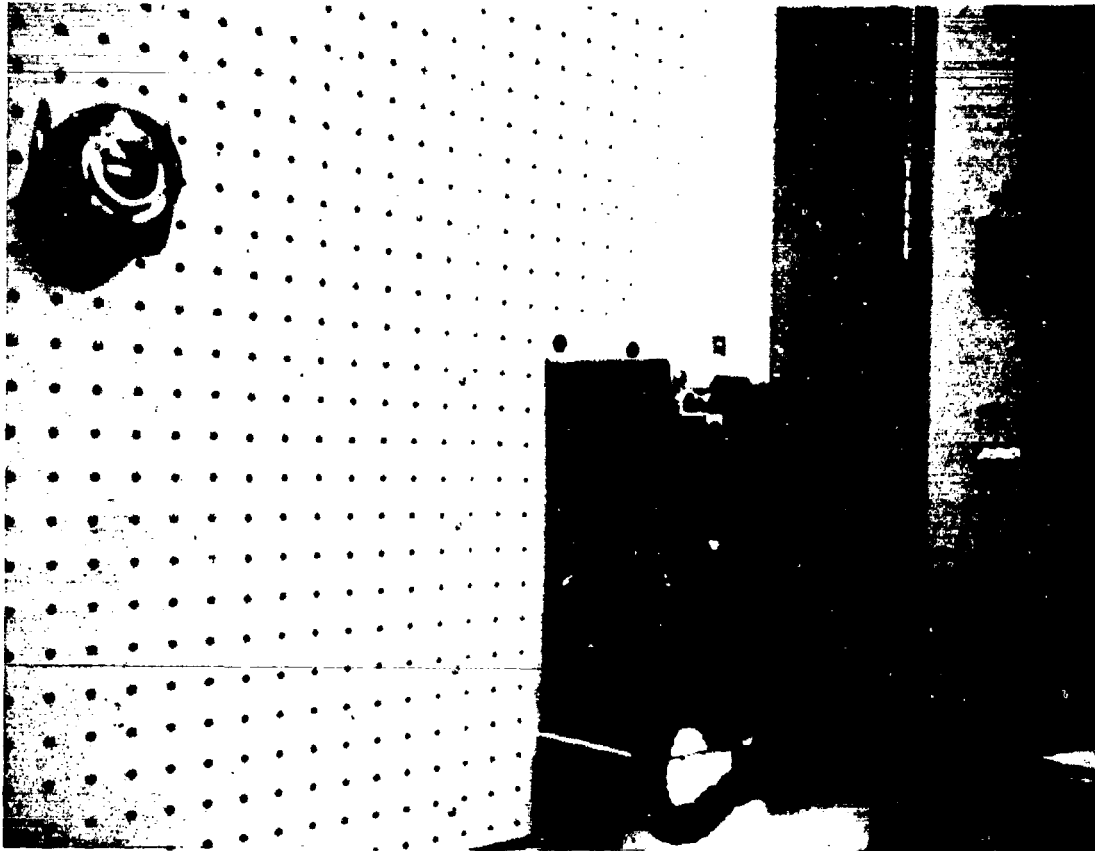


Figure 4. Aluminum Pegboard, Air-Conditioner, Thermostat, and Field Telephone

3. CEILING

The ceiling is over seven feet high inside the shelter. On the right hand side of the shelter, as you enter from the door, is the plenum chamber for the air-conditioners (Figure 5). This plenum runs the entire length of the shelter from the door end to the rear wall. It is about 6 inches high, except where the conditioned air enters the shelter where it is about 12 inches high. It is located in the corner between the side wall and the ceiling, and extends about 20 inches out into the shelter. The plenum chamber has a number of adjustable louvres for selecting the air flow and temperature-distribution patterns.

Eight 100-watt incandescent lights are mounted in two lines down the sides of the ceiling. These lights have Fresnel lenses for a fairly even illumination of at least 20 foot-lamberts at three feet above the shelter floor.

4. FLOOR

The floor is covered with Scotch Tread, which is a grey, nonslip material. A pattern of threaded inserts are used for tie-down bolts for transportation. Eyebolts are screwed in where required, and equipment tied down by using nylon straps with adjustable alligator clamps at each end. The rear end of the shelter has 3/4-inch plywood inserted in the floor to provide additional strength for transport of the air conditioners. These units are on caster dollies and all three are tied down with turnbuckles.



Figure 5. Plenum Chamber and Lights

SECTION IV

PHOTO INTERPRETATION EQUIPMENT

Since the RETS is intended to be used for photo interpretation, the following equipment was furnished as the initial complement. The intent was to keep the cost at a reasonable level, yet provide the most up-to-date equipment that was desired by the interpreters who were to work in the facility.

1. RICHARDS CORPORATION MODEL GFL 940MCE LIGHT TABLE

This table (Figure 6) has a lighted surface 9 inches wide and 40 inches long. It is mounted on an elevating stand, which allows the working height to be adjusted from about 27 inches to 46 inches to suit the individual interpreter. This unit has a light intensity variable from 40 to 900 foot-lamberts in two ranges. It has a manual film drive, and the model T-2-10DC reel brackets allow the use of one 1,000-foot roll of 9-inch film, or two 1,000-foot rolls of 5-inch or 70 mm. film. Both reels are driven from the front of the light table. The elevating stand has a corkboard back for data display, convenience outlets just behind the table, and caster wheels for easy positioning. Zoom 70 and Zoom 95 stereoscopes may be used on the light table, along with other photo interpretation tools as required.

2. RICHARDS CORPORATION MODEL GFL 940MCR LIGHT TABLE

This light table (Figure 6) is basically the same as the 940MCE, except that it is mounted on a fixed stand. The reel brackets are located under the ends of the table, rather than projecting from the ends. The stand does not have caster wheels, outlets, or a corkboard; however, it does contain a cabinet in the knee well for additional storage space.

3. RICHARDS CORPORATION MODEL GFL 3040 LIGHT TABLE

Two of these combination photo interpretation and drafting tables (Figure 7) were supplied. This table has a light surface 30 inches wide and 40 inches long. It is effectively three 940 light tables combined, as each 10-inch by 40-inch section is individually controlled for light intensity. The table has a fixed height of about 30 inches, and the legs are detachable for transport. The two tables are slightly different, in that one has a plastic top which is covered with a replaceable Mylar sheet, and the other has a safety glass top. Both tables are capable of handling four rolls of film, using one set of T-2-10DC reel brackets and another set of modified T-2-10DC reel brackets. These tables do not have provisions for mounting stereoscopes.

4. RICHARDS CORPORATION MODEL MSTU LIGHT TABLE

The Multi-Sensor Take-Up (MSTU) light table has four light surfaces 10 inches wide and 18 inches long. These surfaces are divided in the center of the table by a vacuum take-up chamber. The light intensity is variable from 40 to 900 foot-lamberts on each light surface. This unit will accommodate two rolls of 9-inch, 5-inch or 70 mm. film. The vacuum pump is actuated to take the desired amount of film

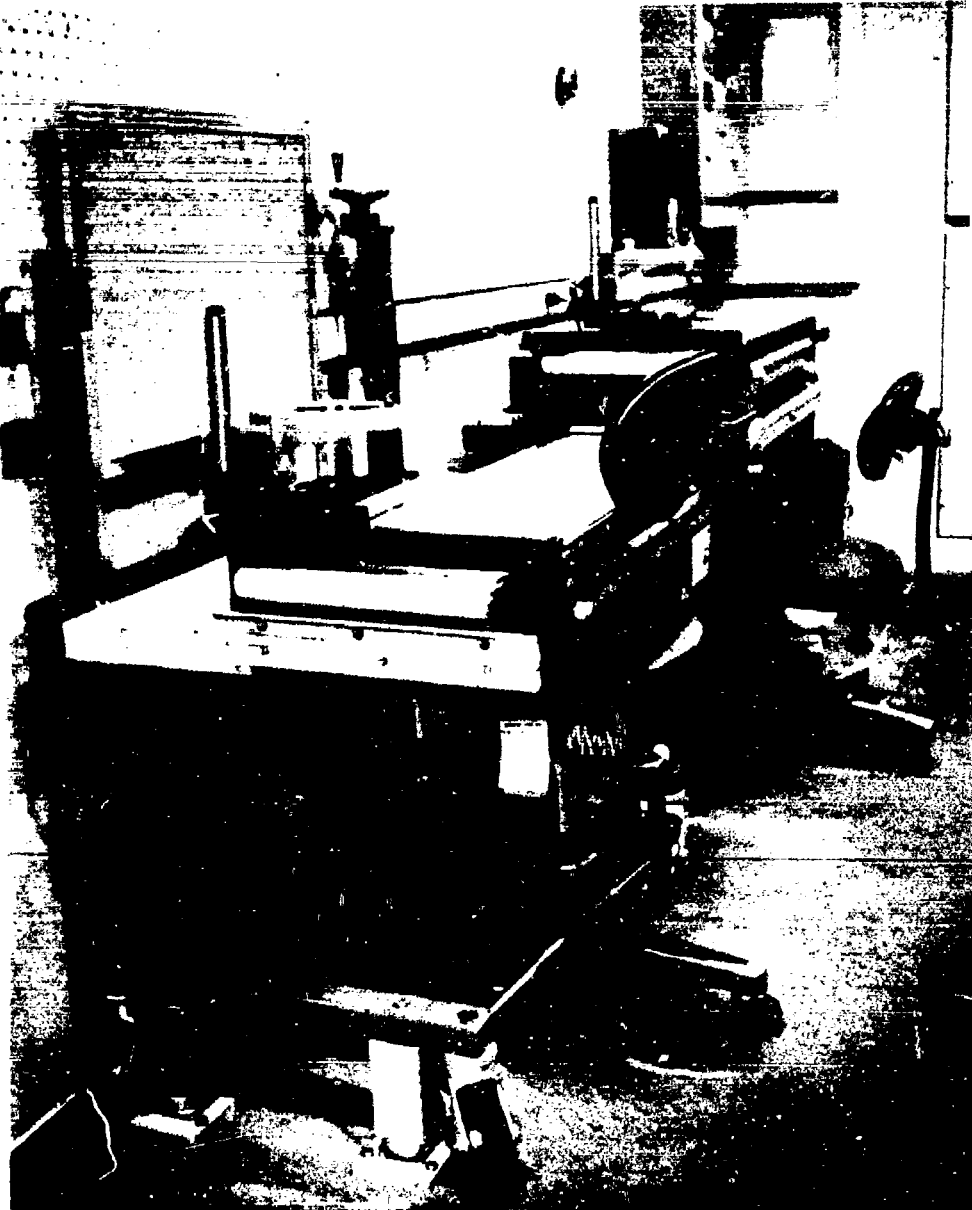


Figure 6. Richards 940MCE Light Table (foreground) and Richards 940MCR Light Table (background), both Shock Mounted for Transport

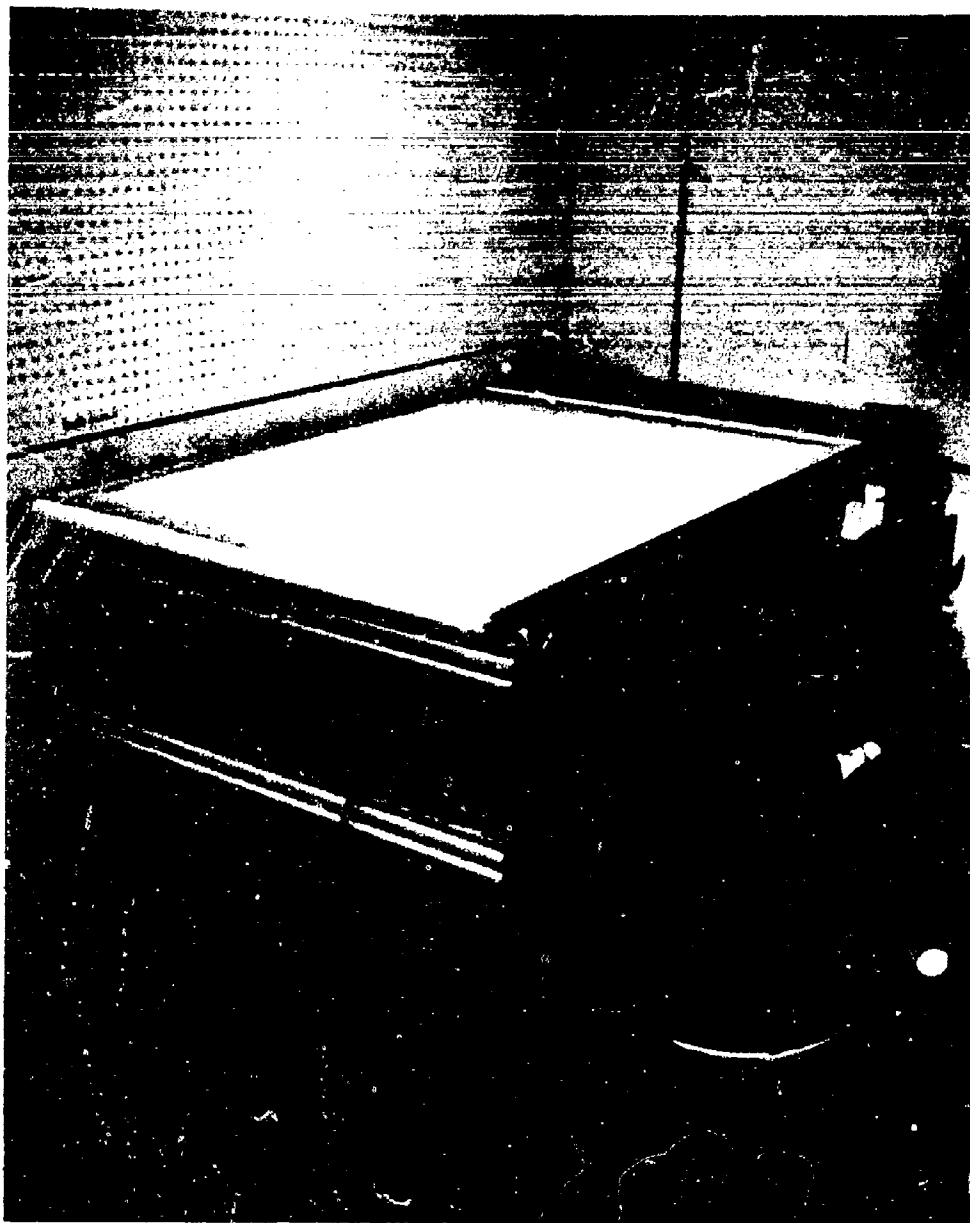


Figure 7. Richards 3040 Light Table with a Second Set of Rails to Accommodate Four Rolls of Film

(up to 6 feet) into the slack loop chamber so that stereo images separated by a distance greater than the stereoscope objective lens separation may be viewed in stereo. The manual film drive consists of T-2-10DC type reel brackets. Stereo capability is provided by a Zoom 70, a Zoom 95, or a Versatile stereoscope which may be mounted in the stereoscope carriage. The MSTU is mounted on an elevating stand so that the height of the work surface may be adjusted to suit the operator.

5. BAUSCH & LOMB ZOOM 70 STEREOSCOPE

The Zoom 70 stereoscope (three supplied) provides stereo viewing of 70 mm. roll film (or binocular viewing of any size film) from 3.75x to 120x through the use of 10x and 20x eyepieces and 0.5x, 1.0x, 2.0x, and 1.0x stereo rhomboid objective lenses. The Zoom 70 may be used on either the GFL 940 or the MSTU light tables.

6. BAUSCH & LOMB ZOOM 95 STEREOSCOPE

The Zoom 95 stereoscope is normally used for stereo on 9-inch and 5-inch film. It does not have a binocular (nonstereo) viewing capability; however, it may be used monocularly. This unit has a magnification range from 2.5x to 20x through the use of 10x and 20x eyepieces. The maximum objective lens separation is 7-3/4 inches, and the working height is 4-3/4 inches. Of the two Zoom 95's supplied, one has 360° image rotation and 5.5x wide-field eyepieces. The 5.5x eyepieces provide a magnification range of 1.4x to 5.5x.

7. BAUSCH & LOMB PROJECTED SCALE MICROMETER

An attachment to the Zoom 70 microscope (stereo capability cannot be used when the micrometer is in place), this unit is utilized for fairly accurate measurements over short distances. Using the 10x and 20x eyepieces on the Zoom 70, this micrometer can measure distances up to 0.075 foot at an image magnification of 7x to 60x. Readings of 0.00001 foot are obtained from the micrometer, with the accuracy estimated at about 0.00005 foot.

8. HANDHELD STEREOSCOPIES

Two sets of handheld stereoscopes were supplied with the shelter: four Abrams CB-1 2x/4x stereoscopes and four Fairchild Camera and Instrument Corporation F-509 2x stereoscopes. The latter stereoscopes were furnished at no cost to the Government by the contractor. They consist of two meniscus lenses which rotate out of a fairly heavy aluminum body. This stereoscope has three legs which unfold from the body, and the leather glasses-type case has a pocket clip. The Abrams CB-1 stereoscope is the standard unit supplied with the F-3 photo interpretation kit. This stereoscope has both 2x and 4x lenses and a blue plastic body with folding legs. The case is made of semirigid grey plastic and affords a high degree of protection to the instrument.

9. STABILIZATION PROCESSOR AND PRINTER

To give the interpreter the capability to make fairly good quality prints from roll or cut film, a printing platen and a processor were supplied. The printing platen is

an Aristo Grid Lamp Products Model F-1709 cold cathode grid approximately 10 inches square. This lamp has been modified by adding a cover to hold the transparency and printing paper in proper contact. The cover is hinged to the light box, and the inside of the cover has a foam liner approximately 1/2-inch thick.

The printing platen uses 120 volt, 60-cycle power, and it may be plugged into any outlet in the shelter. Since its power cord is 6 feet long, the platen may be used at any point in the shelter. Between the plug and the platen is a 1/2 second to 30 seconds timer switch. On this timer unit is a bypass switch which is used for pre-heating. In order to bring the lamp grid up to proper operating temperature, the bypass switch is used and the lamp turned on for about two minutes. The lamp has a thermostatically controlled internal heater unit which operates at all times that the main power switch is on, and if the lamp is heated for 10 minutes prior to use, the bypass switch does not need to be utilized.

Since slow printing paper is used, and since this paper is most sensitive in the ultraviolet end of the visible light spectrum, the paper may be exposed to the shelter incandescent lighting for about 30 seconds without ill effects. The paper is removed from its storage container, placed in the printing platen, the exposure made, and the paper then processed.

The processor is a Fotorite Model 1494, which is about 24 inches long, 5 inches high, and 10 inches wide. Its height is increased at one end when the developer and stabilizer bottlers are turned upside down and inserted for automatic replenishment of the chemicals. The processor operates from 120 volt, 60-cycle power. A foot switch is used to turn the processor on and off. This unit is only "on" when a print is being processed, and it should be turned off at other times.

10. PHOTOGRAMMETRY, INC., QUICK COPY CAMERA

A Model 700 Quick Copy Camera was supplied for making 7x enlargements of selected targets on Polaroid film. The camera is 11-1/4 inches wide, 13 inches high, and 5-1/4 inches deep, and it weighs 6-3/4 pounds. It uses 4"x5" Polaroid or sheet film to produce a 3.5"x4.5" image of a 0.5"x0.64" object. The shutter speed is adjustable from 1 second to 1/125 second, and the aperture is fixed at f/64. The 28 mm. focal length lens provides a film resolution of about 15 lines per millimeter on axis. Polaroid type 52 film was supplied to use with this camera. Type 52 has an ASA rating of 400, is medium contrast, and has a 10-second development time. The Quick Copy Camera is aligned with the framing plate over the desired image, the exposure made, and a 4"x5" print is ready in 10 seconds. This unit is used in place of the printing platen and processor when a magnified image of greater resolution is desired.

11. MISCELLANEOUS PHOTO INTERPRETATION EQUIPMENT

- a. Agfa 8x loupe (4 each)
- b. Boxwood scale, millimeter and 0.001 foot scales (4 each)
- c. A-1 aerial photo sliderule (4 each)
- d. Parallax wedge (2 each)

- e. Proportional dividers (4 each)
- f. 11-point dividers (4 each)
- g. Photo plotting template (8 each)
- h. Magnifying glass (8 each)
- i. Scissors (3 each)
- j. Rapidograph multipoint pen set (4 each)
- k. Keuffel & Esser Mark I drawing instruments set (4 each)
- l. Film cleaning fluid, Kodak No. B359, 4-ounce bottles (24 each)

SECTION V

MISCELLANEOUS EQUIPMENT

The RETS contains a number of pieces of equipment and tools which are required for efficient housekeeping, effective operation, and maintenance.

1. COMMUNICATIONS

a. Field telephone.

The field telephone is a standard TA-312/PT unit and is connected to the signal entry panel near the rear of the shelter. The telephone was originally mounted on the interior shelter wall near the signal entry panel; however, it was moved next to the power control panel near the front door. This move was made because it was decided that the door end of the shelter would most probably be the administrative area and, therefore, the telephone would be more desirable there than at the back end of the shelter.

b. Intercom station.

While not supplied with the shelter, provision was made for the connection of an intercom station. The signal entry panel contains a 1/4-turn multipin connector, and a connector is available at the inside of the shelter. Sufficient pins are available in the connector for a six station all-master intercom system. If the RETS should be utilized in conjunction with a larger facility, then the intercom station may be installed and a cable connected at the signal entry panel.

2. CABINETS

a. File cabinets.

Two Shaw-Walker Company Model SP 1071F four drawer, legal size file cabinets with an external bar and a Sargent & Greenleaf three-combination lock were included with the shelter. These file cabinets are intended to double as safes when approved for classified materials.

b. Shelf cabinets.

Three Metalab Equipment Company No. R4-434X cabinets with five adjustable shelves were supplied. These cabinets are approximately 78 inches tall, 30 inches wide, and 14 inches deep, and have two sliding doors with positive latches. These cabinets are used for storage of unclassified items, including books, printing paper, spare parts, and other supplies, as required.

3. CHAIRS

Two Royal Metal No. 1281 Secretarial Posture Chairs were provided to use with the GFL-940 light tables; and three Royal Metal No. 668M stools were provided for use with the GFL-3040 and the MSTU light tables.

4. TOOLS

In order to perform maintenance, provide protection, and make minor modifications to the shelter and its associated equipment, the following tools were supplied:

- a. Pick
- b. Shovel
- c. Sledge hammer
- d. Level
- e. Hammer
- f. Open end wrench set
- g. Long-nose and standard pliers
- h. Phillips-head and standard screwdriver set
- i. 1/4" electric drill and drill set
- j. Crescent wrench
- k. Clutch-head screwdriver set
- l. Files
- m. 1/4" ratchet set
- n. Solder gun
- o. 10' measuring tape

5. HIGH INTENSITY LIGHTS

Five Tensor Model 5975 high intensity lights were supplied. These lights are useful for high intensity illumination in small areas, and they can be used for additional light when viewing stereo prints with a handheld stereoscope.

6. TABLES

Two Howe Model 32P folding tables were provided to be used for administrative or additional photo interpretation space. These tables are 36 inches wide, 30 inches deep, and 30 inches high (Figure 8). The top is made of Micarta for durability.

7. FIRE EXTINGUISHERS

Two Ansul Chemical Company dry chemical fire extinguishers were provided: one mounted on the floor to the right of the door as you enter the shelter, and the other mounted on the right sidewall near the rear of the shelter. These fire extinguishers are Type I, Size 10, in accordance with MIL-E-22246C.

In addition to the items mentioned above, coat hooks (5), ash trays (3), a pencil sharpener, and a ground rod were supplied. The ground rod is driven into the ground near the shelter and connected to the grounding lug on the power entry panel so that

the potential of electrical shock is eliminated. The other three items can be mounted on a backing board or piece of metal and then mounted on the pegboard, or they can be mounted directly to the shelter wall if desired. Both pegboard hardware and inserts for the shelter wall were included with the RETS.

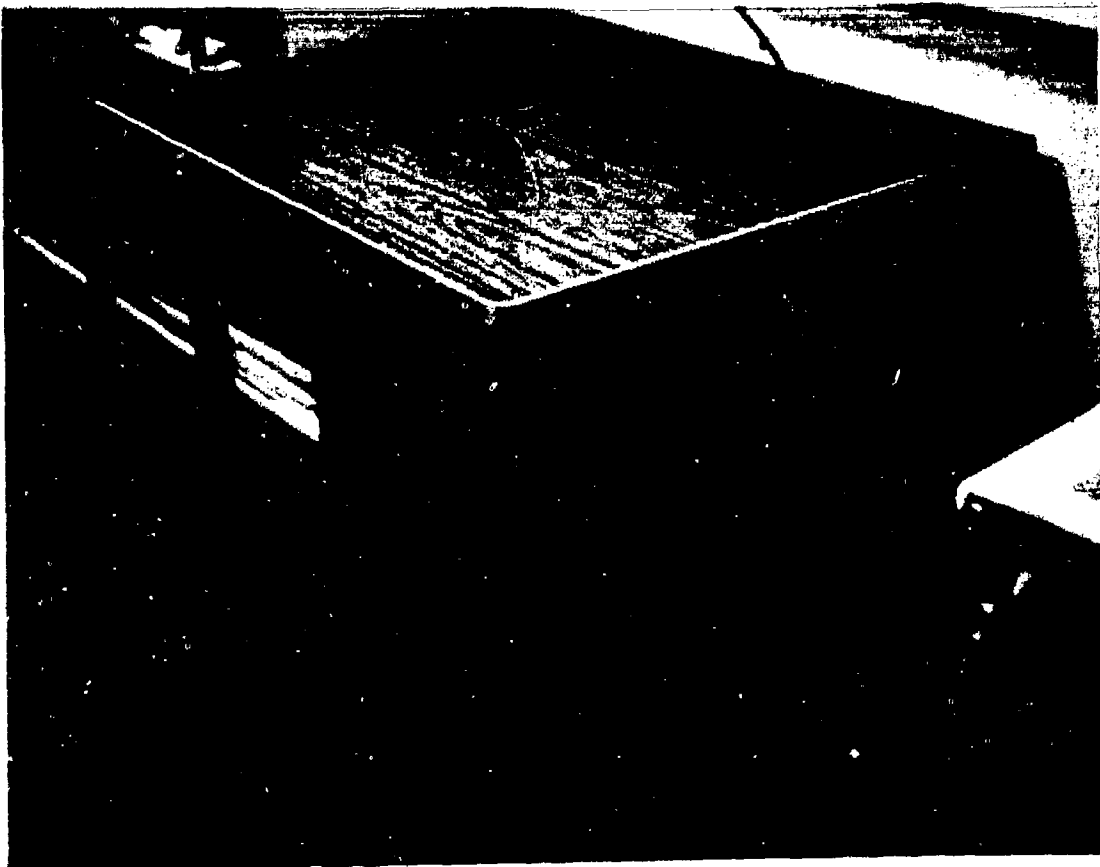


Figure 8. Folding Table for Administrative Use

SECTION VI

SPARE PARTS

The spare parts, included as part of the RETS and not purchased separately, were obtained only for the shelter, generators, air-conditioners, and the auxiliary fuel tank. The shelter spares include Rivnuts and a Rivnut tool, and a shelter repair kit for patching holes in the aluminum skin. The generator spares consist of fuel and oil filters for one year's operation, and parts and gaskets for one minor and one major (ring and valve) overhaul. The air-conditioner spares consist of air filters for one year's operation, and fan and condenser motors. The fuel tank spares consist of a patching kit in case of leaks.

It will be noted that no spare parts were supplied for any of the equipment inside the shelter. Spares for these items were not purchased because it was determined that the equipment selected was generally quite rugged and would operate for at least a year without a failure; and, even if one unit did fail, there were sufficient pieces of equipment available of duplicate or similar function that the failed unit could be returned for repair without seriously hampering the operational status of the RETS.

SECTION VII

OPERATIONAL PHILOSOPHY

1. TRANSPORT

The RETS is not intended to be moved from operational site to operational site at short intervals. Rather, it is intended to be a rugged shelter which will be moved to its operational site, operate for at least six months in one location, and then be moved again if necessary. The RETS is transportable (Figure 9), but it is not mobile. By this it is meant that the time to unpack and set up the shelter equipment, and the time to repack the equipment for movement, was not intended to be short; nor was it intended that the packing materials supplied with the shelter be used more than once or twice. In effect, then, the RETS provides a movable work facility, but it only affords internal storage for transport if the necessary containers and tie-down straps are secured for each move, and the equipment is properly packaged and protected for the move. It can be seen, then, that while the AN/MSQ-58 is mobile (for instance), the RETS is merely transportable. In addition, it was designed to withstand transportation only by truck and air. Its ability to withstand transport by rail is assumed to be acceptable, but it should never be humped (the railroad cars meeting at a speed of 9 m.p.h., following release at the hump, can result in longitudinal shocks of at least 30 g's).

2. OPERATION

As previously mentioned, the basic shelter, generators, and air-conditioners provide a work facility that may be utilized for almost any task where it is desired that equipment not be permanently bolted to one location. The particular task for which this shelter is being utilized is photo interpretation. As such, it is almost a complete reversal from the design philosophy of the previous shelter equipment supplied (the AN/MSQ-58) and the equipment planned to be supplied in the future (the Tactical Information Processing and Interpretation - TIPI - System). Because the equipment is not tied down to a particular location, the RETS combines the advantages of an aluminum shelter and the B-2A shelter. The work facility could be organized in whatever way was deemed to be most efficient in the B-2A, and it could easily be rearranged if the first way is not satisfactory (Figures 10 and 11). This is also true in the RETS.



Figure 9. Shelter and Generators Tied Down on a Flatbed Truck for a Long Haul

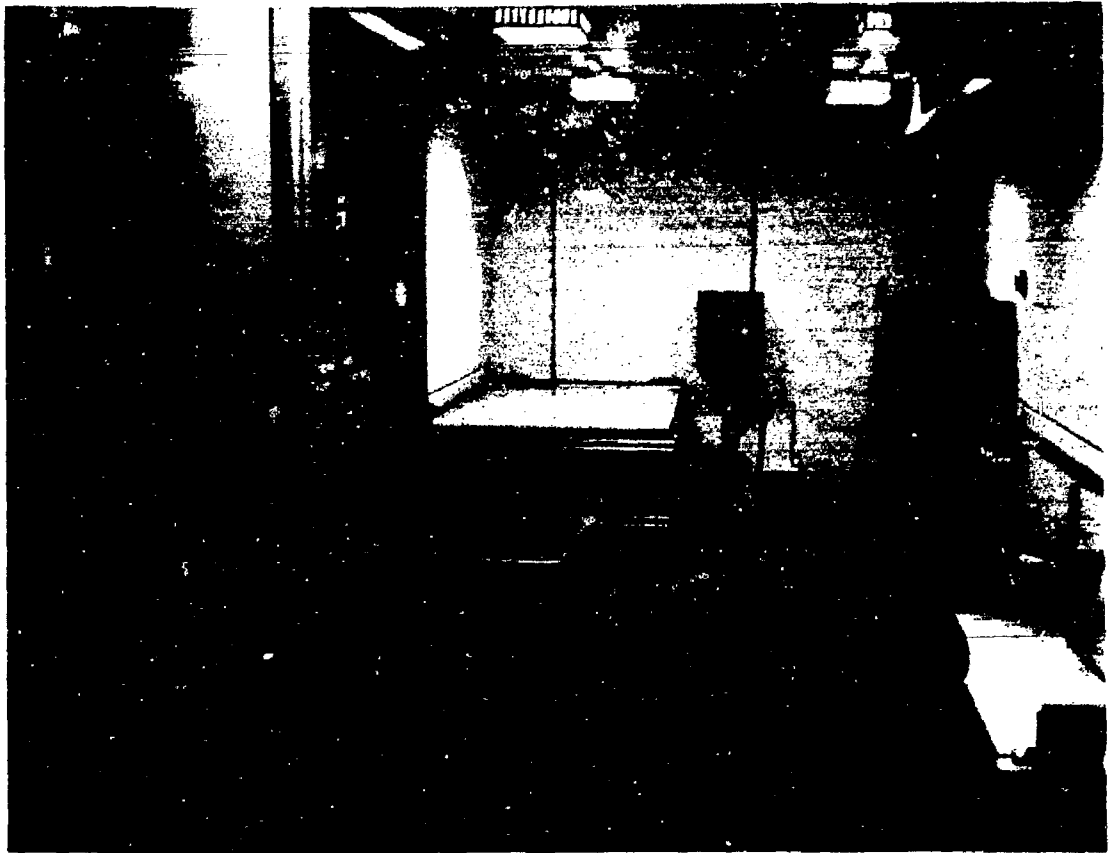


Figure 10. Interior of the Shelter, Looking at the Rear Half, with the Equipment Set Up in One Possible Configuration



Figure 11. Interior of the Shelter, Looking at the Front Half, with the Equipment Set Up in One Possible Configuration

SECTION VIII

CONCLUSION

It should be noted that the RETS is a test unit, just as its name states. Because of this, it is one-of-a-kind, and there is no intent to purchase additional units. In fact, this shelter has no nomenclature and no military specifications. The shelter and equipment are not militarized; however, if they are not poorly treated, it is expected that they will stand up almost as well as if they were militarized. Militarized equipment is much more expensive than commercial equipment; and in this particular case, it is the concept that is being tested and not the equipment.

If the test is successful (i.e., if it shows that this particular shelter and its flexible work-station arrangement provides a proper and efficient means for accomplishing photo interpretation tasks), then the RETS can be considered as a prototype shelter for operational usage. Until that time, however, the intent is to use the RETS to the fullest extent to provide data for future image interpretation shelter systems.

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13. ABSTRACT The Reconnaissance Exploitation Test Shelter (PETS) was designed as a very flexible work facility for photo interpretation. Work stations may be positioned in any arrangement desired, within the constraints of the 8' x 8' x 23' long shelter. Three-phase, 60 cycle, 110/220 volts power is supplied by two 12KW diesel generators; and air conditioning is provided by two 40,000 Btu units connected to the shelter by flexible ducts. The internal equipment complement consists of photo interpretation light tables, stereoscopes, and other photo interpretation tools, cabinets, and aluminum pegboard on both side walls for shelving, hooks, etc. Spare parts for one year's operation are included for the critical equipment.		

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14 KEY WORDS	LINK A		LINK B		LINK C	
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